

90191



901910



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA



For Supervisor's use only

Level 1 Science, 2008

90191 Describe aspects of physics

Credits: Five

2.00 pm Thursday 20 November 2008

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only		Achievement Criteria		
Achievement		Achievement with Merit		Achievement with Excellence
Describe aspects of physics.	<input type="checkbox"/>	Explain aspects of physics.	<input type="checkbox"/>	Discuss aspects of physics. <input type="checkbox"/>
Overall Level of Performance				<input type="checkbox"/>

The following may be useful.

$$V_{\text{average}} = \frac{d}{t}$$

$$F = ma$$

$$a = \frac{\text{change in speed}}{\text{change in time}}$$

$$E_p = mgh$$

$$F_{\text{gravity}} = mg$$

$$E_k = \frac{1}{2}mv^2$$

$$\text{Work} = Fd$$

$$P = \frac{E}{t}$$

$$V = IR$$

$$P = IV$$

$$g = 10 \text{ m s}^{-2}$$

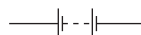
$$g = 10 \text{ N kg}^{-1}$$



resistor



lamp



battery



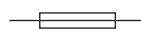
switch



voltmeter



ammeter



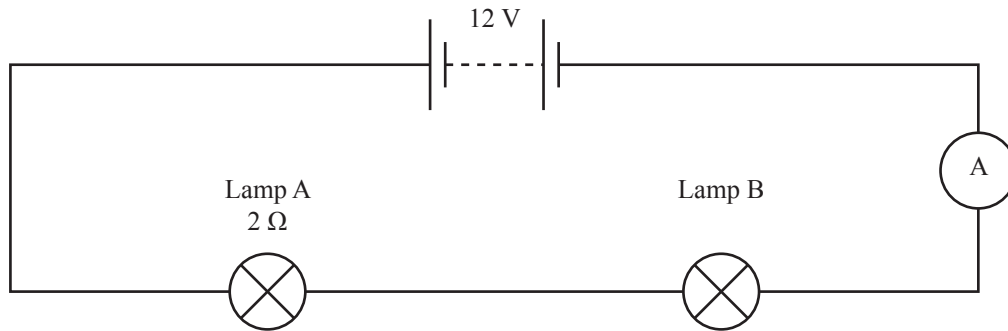
fuse

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You are advised to spend 40 minutes answering the questions in this booklet.

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QUESTION ONE: ELECTRICAL CIRCUITS



The circuit above contains two lamps which are **not** the same.

The current was measured and found to be 2 A.

- (a) Using $V = IR$, calculate the voltage across lamp A.

Voltage = _____ V

- (b) Calculate the power output of lamp A in this circuit.

Power = _____ W

Lamp B glows more brightly than lamp A.

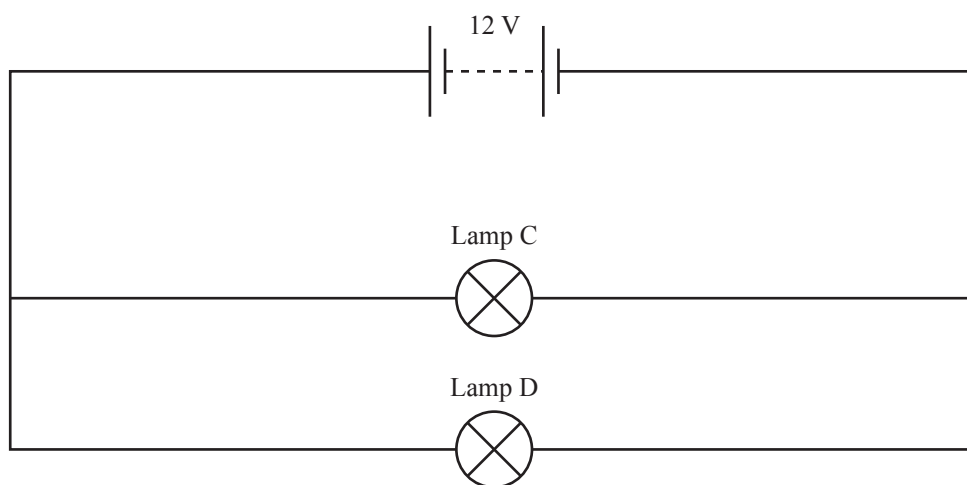
- (c) Discuss why **lamp B** is brighter than lamp A in terms of resistance, voltage, current, and power output.

A third lamp, identical to lamp A, is added in series to this circuit.

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- (d) Explain what effect this additional lamp has on the total current and resistance of the circuit.

The circuit is then changed, as shown below.



Lamps C and D are **identical**.

- (e) The power output of lamp C is 36 W in this circuit.

Calculate the resistance of lamp C.

Resistance of C = _____ Ω

- (f) If the circuit is left on for 30 seconds, calculate the amount of energy transformed into heat and light by lamp C.

Energy = _____ J

QUESTION TWO: A REMOTE CONTROL CAR

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A child plays with a remote control car on concrete.

- (a) The car starts from rest and travels a distance of 6 m in 3 seconds.

Calculate the average speed of the car in the 3 seconds.

Average speed = _____ m s⁻¹

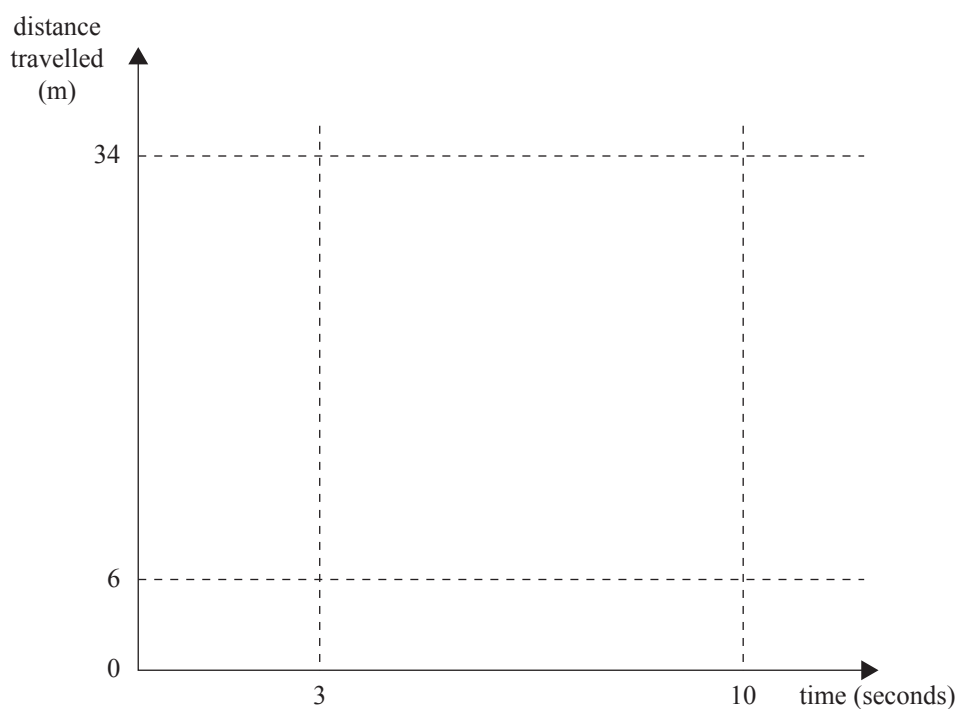
The mass of the car is 400 grams (0.4 kg).

- (b) The car then travels a further 28 m at a constant speed of 4 m s⁻¹ for 7 seconds.

Using the equation $E_k = \frac{1}{2}mv^2$ calculate the kinetic energy of the car at this speed.

Kinetic energy = _____ J

- (c) Using the information given in (a) and (b), draw in the **appropriate shaped** lines on the distance-time graph below to represent the journey of the car during the first 10 seconds.

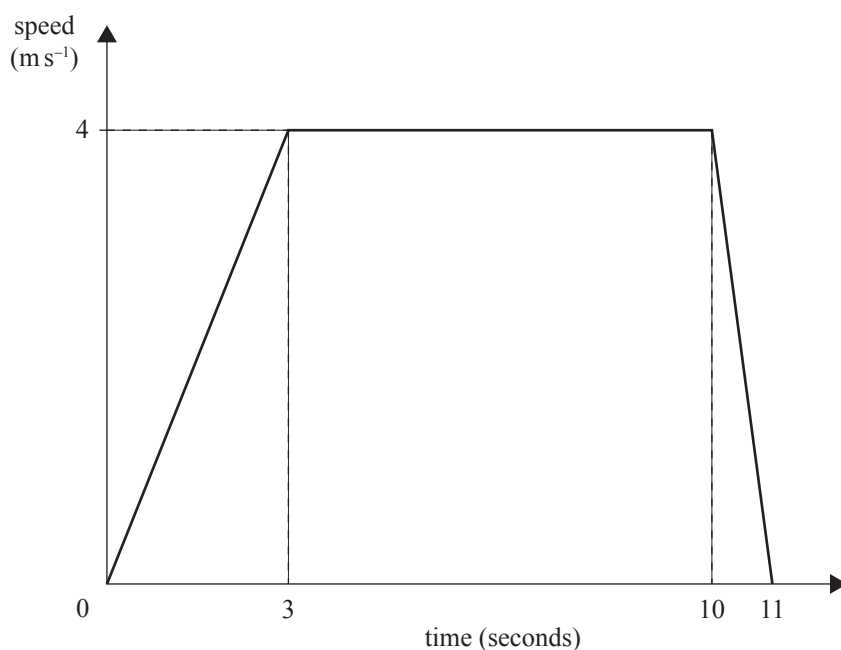


(d) Discuss **why** the car's speed rapidly decreases as it drives into the sand. You should consider:

- [illegible]

- (e) The speed-time graph below represents the motion of the car from its starting point to when it stops.

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The mass of the car is 400 g (0.4 kg).

With reference to the information in the graph, calculate the net force acting on the car between 0 and 3 seconds. Give the correct unit with your answer.

Net force = _____ (_____)
unit

Older homes with wooden floors can lose a large amount of heat through the floor.

Underfloor insulation helps to reduce heat loss by conduction. One way of achieving this is to put insulation across the bottom of the floor joists, or in between them, as shown in the diagrams below.

Adapted from www.insinchomesolutions.co.nz/cocoon.html

In your discussion you should:

- [illegible]

**Extra paper for continuation of answers if required.
Clearly number the question.**

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Question
number